Monitoring of tropical vegetation properties affected by fire (frequency, exposure)

Ramesh K. Ningthoujam[1,2*], Sandy P. Harrison[1,3] and I. Colin Prentice[1,2]

[1]Leverhulme Centre for Wildfires, Environment and Society; [2]Georgina Mace Centre for the Living Planet, Life Sciences, Imperial College London, UK; [3]Geography and Environmental Science, University of Reading, UK

1. INTRODUCTION

Higher temporal- and medium-spatial resolutions optical Landsat derived seasonal greenness (Normalized Difference Vegetation Index- NDVI), moisture content (Normalized Difference Moisture Index-NDMI) and fire severity (Normalized Burned Ratio-NBR) are useful to estimate post-fire tropical vegetation properties at landscape level. We aim to explore statistical relationship for tropical vegetation species number and basal area to fire frequency and exposure types using seasonal Landsat-7 and 8 sensors derived greenness, moisture content and fire severity indices.

2. METHODOLOGY

- Peak (dry) and end (wet) seasons Landsat derived greenness, moisture content and fire severity indices using Landsat Enhanced Thematic Mapper Plus (ETM+) and Operational Land Imager (OLI) in Brazil and Colombia.
- Field sampled species number and basal area in fire (frequency, exposure) of tropical wet evergreen and riparian forest biomes.

3. RESULTS

- OLI derived seasonal NDVI, NDMI and NBR showed higher values to fire frequency and exposure types than ETM+ in complex forest biomes (**fig 1**).
- Late-season NDVI, NDMI, NBR showed stronger relationships with species number and basal area to fire frequency (**fig 2**).
- Late-season NDVI, NDMI, NBR showed stronger relationships with species number and basal area to fire exposure types (**fig 3**).

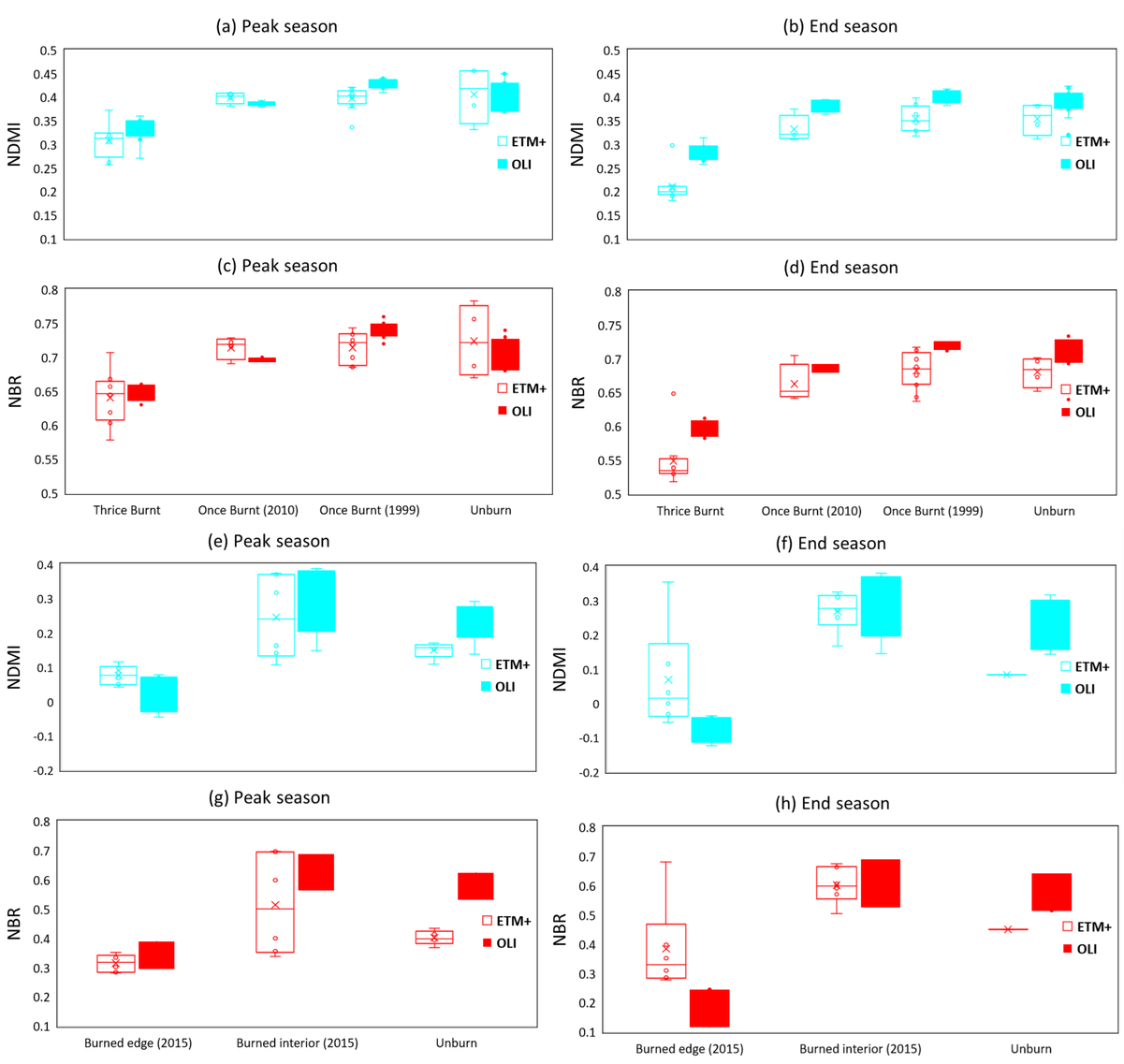


Fig 1. Sensitivity of seasonal NDMI and NBR for ETM+ and OLI to fire frequency (a-d panels) and exposure types (e-h panels).

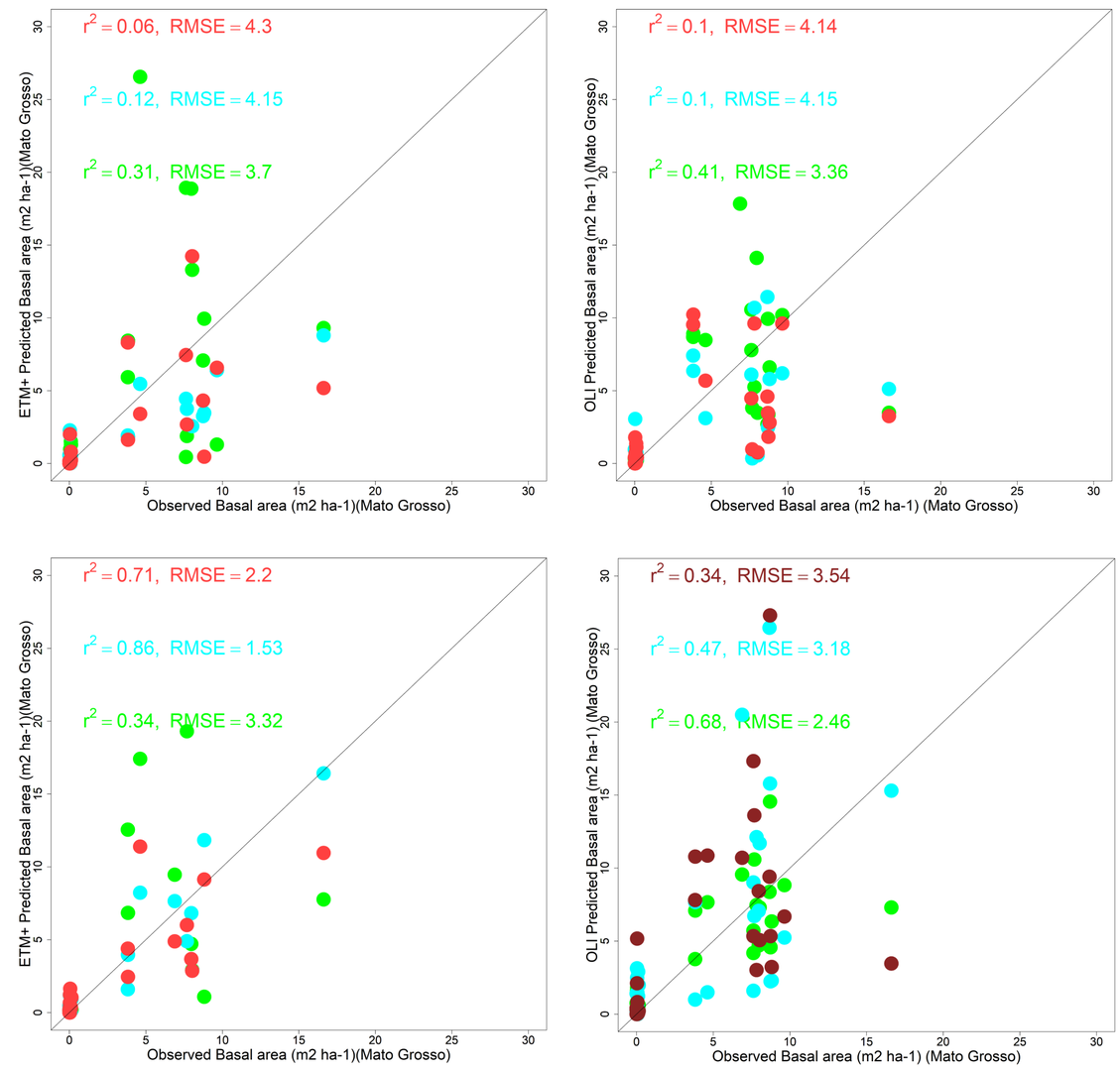
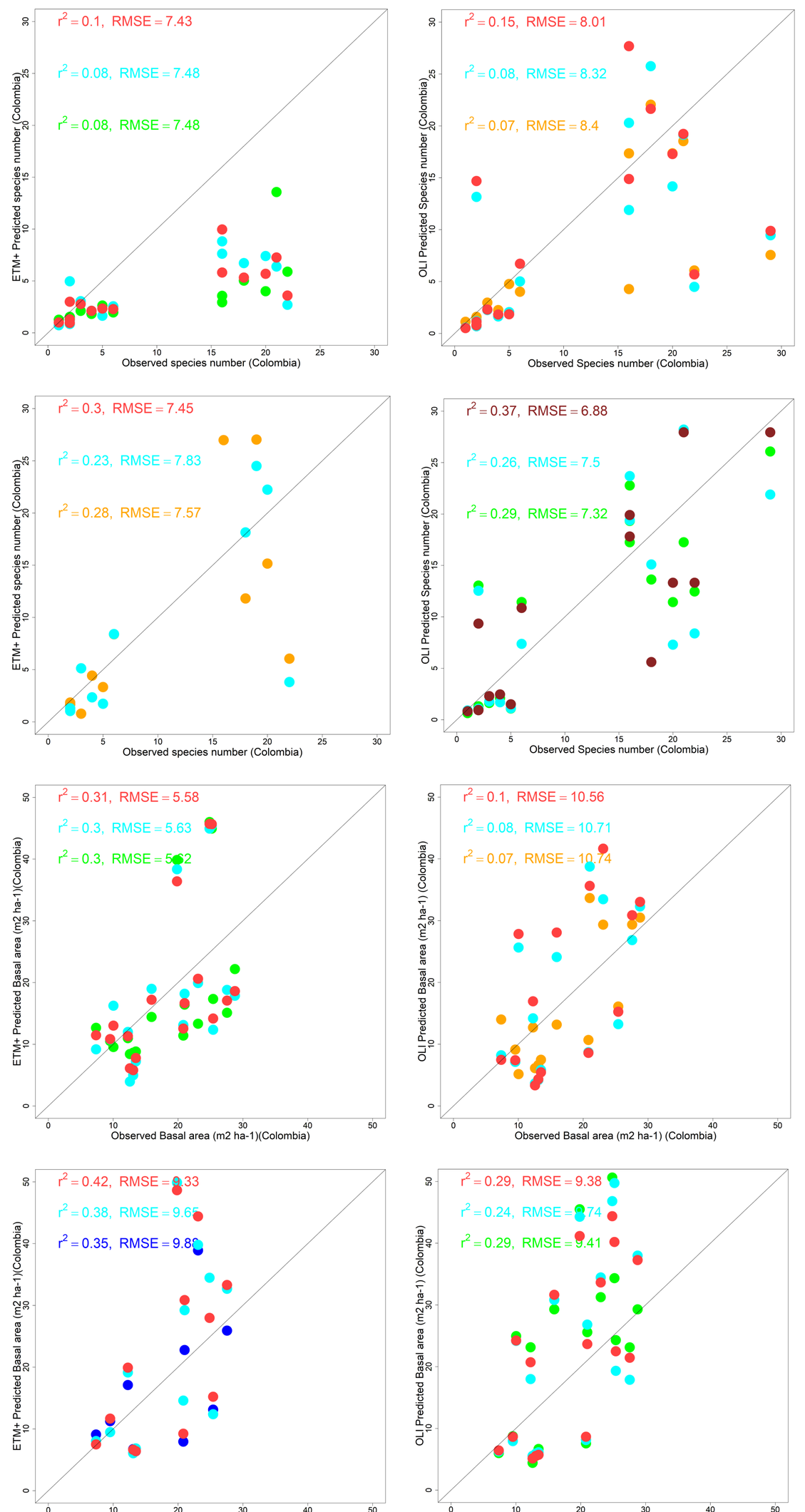


Fig 2. Landsat ETM+ (left panel), OLI (right panel) VIs predicted species number & basal area in peak & late season to fire frequency.



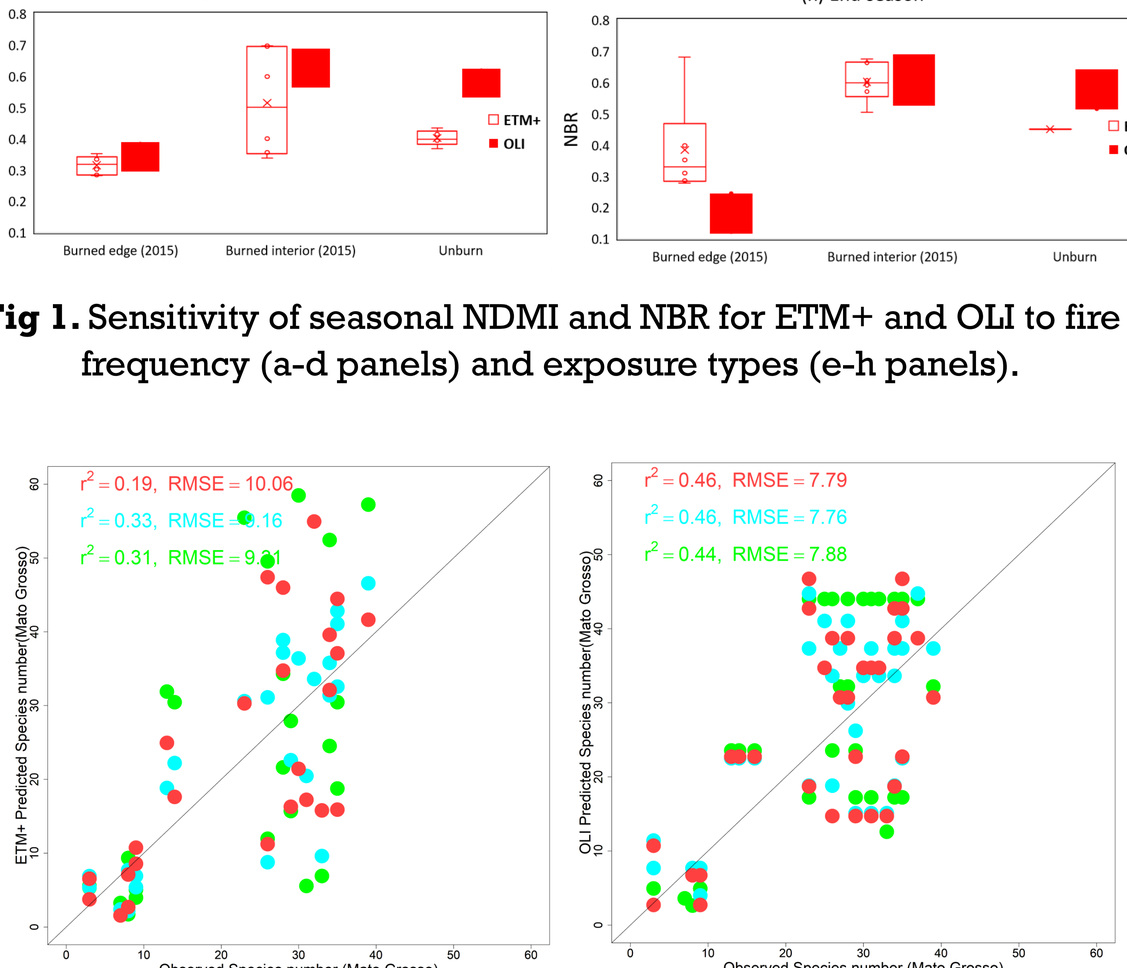


Fig 3. Landsat ETM+ (left panel), OLI (right panel) VIs predicted species number & basal area in peak & late season to fire exposure.

4. CONCLUSION

- Late season Landsat derived greenness, moisture content and fire severity indices are useful to infer fire (frequency, exposure) induced vegetation species number and basal area in more complex tropical forest types.
- OLI vegetation indices provides similar or better sensitivity for species number and basal area than ETM+ to fire frequency and exposure types.

ACKNOWLEDGEMENTS

Field data: Nayane P., Maria C., Dolors A., Imma O., Ted F.